

**REMARKS**

Claims 1-36, 42 and 43 are pending in this application. By this Amendment, the specification and claims 1, 13, 14, 19, 31 and 32 are amended and claims 37-41 are canceled.

Restriction was required and Applicants elected Group I, claims 1-36. Applicants reserve the right to file one or more divisional applications based on non-elected claims 37-41.

The specification was objected to and has been amended responsive to the objection. It is respectfully requested that the objection be withdrawn.

Claims 13, 14, 31 and 32 were rejected under 35 U.S.C. §112, second paragraph, and have been amended responsive to the rejection. It is respectfully requested that the rejection be withdrawn.

Claims 1-36 were rejected under 35 U.S.C. §103(a) over Applicants' Admitted Prior Art (AAPA) in view of DE 19608937 (DE'937), Golker, U.S. Patent No. 4,406,939, and DE 3042650 (DE'650). The rejection is respectfully traversed.

None of the applied references disclose or suggest a method or an apparatus for producing precision marks with a laser that produces a plurality of ultra-short output pulses of a fluence at the substrate such that the metrological scale marks are formed by laser ablation, wherein the plurality of ultra-short output pulses have a duration such that the scale markings are formed on the scale substrate by a laser ablation mechanism in which the molten stage is omitted, as recited in claims 1 and 19.

AAPA discloses methods for forming scale marks on a measurement scale substrate using a laser. However, AAPA fails to provide any disclosure or suggestion with regard to using a pulsed laser that generates short pulses or describe the process by which the mark is formed. In particular, AAPA fails to disclose or suggest using ultra-short pulses or operating

in a laser ablation regimen in which material is removed by a laser ablation mechanism in which the molten stage is omitted.

DE'937 disclose a method for marking a substrate using a pulsed laser. DE'937 uses an Excimer laser that produces pulses of approximately 20 ns (para. 4 of translation) and the laser pulse is used to melt the surface of the substrate (para. 8). The re-solidification of the melt provides a region of different surface roughness that has different optical properties to the surrounding material. Although DE'937 mentions that pulses of a much shorter duration can be used, the duration is selected in order to avoid heat dissipation from the process area (i.e. ensure that melting effect occurs efficiently).

As disclosed in DE'937, the laser pulse that is used to form scale marks must always be sufficiently long so that melting occurs. Otherwise, the re-solidification stage would not happen. As such, one skilled in the art reading DE'937 in combination with AAPA would have actually been led away from using ultra-short pulses having a duration such that the scale marks are formed on a scale substrate by a laser ablation mechanism in which the molten stage is omitted.

Golker discloses various methods for manufacturing a code disk for encoders. Golker discloses connecting a code disk to be marked to an angle measuring device. The code disk is then rotated and a laser is fired to mark to code disk when certain angular positions are reached. Although the laser is switched on and off to mark the required pattern on the code disk, Golker fails to provide any disclosure or suggestion with regard to using short or ultra-short laser pulses. Golker's laser is a standard CW (i.e. non-pulsed) laser that is switched on and off and is not a pulsed laser capable of producing ultra-short pulses. Golker thus fails to provide any disclosure or suggestion with regard to using the ultra-short output pulses as recited in claims 1 and 19.


DE'650 fails to overcome deficiencies of AAPA, DE'937 and Golker. Should the Examiner continue to use DE'650, the Examiner is requested to specifically explain where in DE'650 the features of claims 1 and 19 are suggested.

It is respectfully requested that the rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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JAO:SMS/sas

Attachment:  
Petition for Extension of Time

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